Annual Report

Washington State Department of Ecology
Project #2003-017-00
Habitat Characterization for
Integrated Status and Effectiveness Monitoring in
The Wenatchee Subbasin
Glenn Merritt - 1/15/05

Abstract:

During July-September, the Washington State Department of Ecology (WDOE) sampled habitat, including macroinvertebrate assemblages, among 50 "randomly" chosen stream reaches in the Wenatchee River Basin. Of these, 5 sites were re-sampled to assess measurement variability. Field data were recorded onto Rite-in-Rain paper forms that we constructed prior to the field season. Habitat measurements were closely coordinated with fish population assessments by Wenatchee National Forest staff among a subset (10) of the reaches. Data were entered into electronic files and reviewed for errors prior to delivery. Metrics were then constructed.

Introduction:

Project #2003-017-00 (Project) seeks to develop two novel monitoring and evaluation programs:

(i) subbasin-scale pilot status and trend monitoring efforts for anadromous salmonids and their habitat in the Wenatchee, John Day and South Fork Salmon River basins, and

(ii) effectiveness monitoring for suites of habitat restoration projects in selected watersheds within the three target subbasins. This work – critical for implementing the 2000 NMFS FCRPS Biological Opinion (RPA Actions 180, 181, and 183) (BiOp) – builds on current status and trend monitoring programs within each of these basins. Several regional and local organizations are funding and implementing these programs. In short, this project will integrate existing and new monitoring and evaluation activities in three pilot subbasins to help ensure that provisions of the BiOp are satisfied.

The WDOE's work on this project enables the Bonneville Power Administration (BPA) to implement the Project in the Wenatchee Subbasin. Specifically, within this SOW, Washington State Department of Ecology (WDOE) is characterizing channel and riparian physical habitat quality within the Wenatchee River Subbasin. Elements of this work expand upon previous monitoring work being conducted by WDOE and are key components of the two monitoring and evaluation programs developed by the Project. Elements of this work are interrelated with other Project components including fish abundance and distribution surveys. This work provides the context for, and facilitates the interpretation of, data collected in other Project components. For example, habitat quality characterizations provide the context for understanding watershed-scale variation in spawner distribution and smolt production. This work also serves as the reach-scale ground truthing component of GIS classification work.

Project Area

Sampling occurred in randomized stream reaches in the Wenatchee Sub-basin (Water Resource Inventory Area 45) of the Upper Columbia Basin. Reaches were twenty times the bankfull width, with minimum length of 150 m and maximum length of 500 m. Locations and sample dates are listed below.

REACH LOCATIONS

SiteID	LatMapWGS84	LonMapWGS84
WC503432-001	47.76699829102	-120.72699737549
WC503432-002	47.96620178223	-121.10199737549
WC503432-003	47.48009872437	-120.39399719238
WC503432-004	47.606300354	-120.54900360107

WC503432-005	47.58990097046	-120.48600006104
WC503432-006	47.60850143433	-121.02700042725
WC503432-007	47.9015007019	-120.76999664307
WC503432-008	48.00690078735	-120.96499633789
WC503432-009	47.65169906616	-120.66999816895
WC503432-010	47.42649841309	-120.84400177002
WC503432-011	47.55759811401	-120.57499694824
WC503432-012	47.65390014648	-121.00000000000
WC503432-013	47.92240142822	-120.85500335693
WC503432-014	48.04899978638	-120.91100311279
WC503432-015	47.91889953613	-120.70999908447
WC503432-016	47.92979812622	-120.88200378418
WC503432-017	47.79050064087	-120.64099884033
WC503432-018	47.57949829102	-120.66300201416
WC503432-019	48.04389953613	-120.76599884033
WC503432-020	47.83810043335	-120.88500213623
WC503432-021	47.71820068359	-120.66300201416
WC503432-022	47.70970153809	-120.58699798584
WC503432-023	47.96689987183	-120.88500213623
WC503432-024	47.50400161743	-120.63400268555
WC503432-025	47.68190002441	-120.66600036621
WC503432-026	47.55879974365	-120.90599822998
WC503432-027	47.37870025635	-120.68800354004
WC503432-028	47.55369949341	-120.67500305176
WC503432-029	47.38899993896	-120.60500335693
WC503432-030	47.49369812012	-120.44699859619
WC503432-031	47.9314994812	-121.02700042725
WC503432-032	47.76760101318	-120.77799987793
WC503432-033	47.98580169678	-120.89499664307
WC503432-034	47.56620025635	-121.06300354004
WC503432-035	47.72629928589	-120.56900024414
WC503432-036	47.44699859619	-120.81400299072
WC503432-037	47.87609863281	-121.02500152588
WC503432-038	47.9109992981	-120.73999786377
WC503432-039	47.92589950562	-120.90699768066
WC503432-040	47.51959991455	-120.96499633789
WC503432-041	47.58129882813	-120.60800170898
WC503432-042	47.62720108032	-120.64399719238
WC503432-043	47.70169830322	-121.05400085449
WC503432-044	47.49879837036	-120.36000061035
WC503432-045	47.49219894409	-120.72499847412
WC503432-046	47.42580032349	-120.70300292969
WC503432-047	47.83530044556	-120.82099914551
WC503432-048	47.7652015686	-120.6549987793
WC503432-049	47.38520050049	-120.49299621582
WC503432-050	47.47560119629	-120.50399780273
WC503432-151	47.85350036621	-120.96600341797
WC503432-152	47.36069869995	-120.56800079346
WC503432-153	47.77799987793	-121.02100372314
WC503432-154	47.44060134888	-120.90200042725
WC503432-155	47.52619934082	-120.62300109863
WC503432-156	47.54790115356	-120.75499725342
WC503432-157	47.90579986572	-121.1490020752
WC503432-158	47.71659851074	-121.01999664307
WC503432-159	47.94020080566	-120.92800140381
WC503432-160	47.91379928589	-120.68800354004

WC503432-161	48.02529907227	-120.89700317383
WC503432-162	47.59560012817	-120.6309967041
WC503432-163	47.65729904175	-121.0240020752
WC503432-164	47.9254989624	-120.70300292969
WC503432-165	47.35060119629	-120.43299865723
WC503432-166	47.7739982605	-120.81999969482
WC503432-167	47.56029891968	-120.53199768066
WC503432-168	47.57270050049	-120.5120010376
WC503432-169	47.89799880981	-121.07800292969

SAMPLE DATES:

SITE_ID	START_DATE	END_DATE
WC503432-001	8/12/2004	8/12/2004
WC503432-002	7/21/2004	7/21/2004
WC503432-003	9/2/2004	9/3/2004
WC503432-006	8/4/2004	8/4/2004
WC503432-007	7/7/2004	7/7/2004
WC503432-009	9/2/2004	9/2/2004
WC503432-010	7/21/2004	7/22/2004
WC503432-011	8/20/2004	8/20/2004
WC503432-012	7/28/2004	7/28/2004
WC503432-014	9/8/2004	9/8/2004
WC503432-015	7/8/2004	7/8/2004
WC503432-016	7/13/2004	7/14/2004
WC503432-017	7/28/2004	7/28/2004
WC503432-018	9/1/2004	9/1/2004
WC503432-019	7/8/2004	7/8/2004
WC503432-021	8/4/2004	8/4/2004
WC503432-022	7/29/2004	7/29/2004
WC503432-022	8/5/2004	8/5/2004
WC503432-025	7/29/2004	7/29/2004
WC503432-026	8/19/2004	8/19/2004
WC503432-027	8/17/2004	8/18/2004
WC503432-028	7/23/2004	7/23/2004
WC503432-029	8/25/2004	8/25/2004
WC503432-032	8/12/2004	8/12/2004
WC503432-034	8/31/2004	8/31/2004
WC503432-035	7/8/2004	7/8/2004
WC503432-036	7/22/2004	7/22/2004
WC503432-038	8/3/2004	8/3/2004
WC503432-038	8/5/2004	8/5/2004
WC503432-039	7/6/2004	7/6/2004
WC503432-040	9/8/2004	9/8/2004
WC503432-041	7/27/2004	7/27/2004
WC503432-042	7/20/2004	7/20/2004
WC503432-043	8/10/2004	8/10/2004
WC503432-046	8/26/2004	8/26/2004
WC503432-047	8/18/2004	8/18/2004
WC503432-048	7/14/2004	7/14/2004
WC503432-049	7/6/2004	7/6/2004
WC503432-151	7/15/2004	7/15/2004
WC503432-152	8/25/2004	8/25/2004
WC503432-152	8/27/2004	8/27/2004
WC503432-153	8/27/2004	8/27/2004
WC503432-154	8/28/2004	8/29/2004

WC503432-155	8/19/2004	8/19/2004
WC503432-158	8/11/2004	8/11/2004
WC503432-159	7/13/2004	7/13/2004
WC503432-162	7/30/2004	7/30/2004
WC503432-163	7/27/2004	7/27/2004
WC503432-164	7/15/2004	7/15/2004
WC503432-165	8/3/2004	8/3/2004
WC503432-166	7/30/2004	7/30/2004
WC503432-166	8/6/2004	8/6/2004
WC503432-168	8/26/2004	8/26/2004
WC503432-169	8/13/2004	8/13/2004
WC503432-169	8/17/2004	8/17/2004

Materials and Methods

Channel and riparian habitat quality were characterized by collecting data for each specific indicator listed in Table 1 per protocols described in Hillman (2004) at each of 50 sampling sites. WDOE trained all field personnel in necessary methodological and safety protocols.

In advance of the field season, WDOE met with USFS to plan season sampling schedule and establish coordination protocols. All sites to be sampled met access and safety criteria determined through reconnaissance conducted by USFS and CCCD. Some reconnaissance occurred after the start of the sampling season.

A component of the habitat quality characterization included collecting macroinvertebrate samples per protocols in Hillman (2004). These samples were collected, stored, and delivered to NOAA-Fisheries on October 11, 2004.

Five of the 50 sites from the Sample Site List were sampled by two independent crews in order to estimate precision. Each crew characterized channel and riparian habitat quality by collecting data for each specific indicator listed in Table 1. Sample dates are listed above.

WDOE delivered one set of photocopied raw data sheets and quality controlled, geo-referenced raw data, with summarized site-averaged values for each indicator listed in Table 1, in Microsoft-Access format to NOAA-Fisheries. WDOE also provided digital photographs of the sampling sites to document physical habitat conditions at the time of sampling and to facilitate data sheet quality assurance review.

Summary of Results:

Macroinvertebrate samples (54) were provided to NOAA fisheries on October 12, 2004. Raw, quality-assured habitat data (12 Microsoft-Access Tables), photographs and photocopies of field forms were provided to NOAA-Fisheries on December 30, 2004. Metric data (31 Microsoft-Access Tables) for Table 1 indicators were provided to NOAA-Fisheries on January 10, 2005. Issues related to the field survey were reported to the Upper Columbia Regional Technical Team on January 12, 2005. The Powerpoint Presentation is attached to this report.

Table 1. The specific biological and physical metrics that were monitored.

General characteristics	Specific indicators	Data to be Delivered for Each of 50 Sites Plus 5 Re-Sampled Sites
Site Description		Site number (from Sample Site List); stream name; short site location description (e.g. Trout Creek upstream of Pine Campground); actual coordinates; field crew member names; date(s) sampled; time began sampling; general narrative comments about the site including any unusual habitat features or notes regarding site location or access.
Habitat Quality	Dominant substrate	Raw pebble count data at 105 measurement points; site-calculated dominant substrate size.
	Embeddedness	Raw embeddedness data at 55 measurement points; site-averaged embeddedness percent.
	LWD	Site-total count of LWD pieces within each of three size categories (pieces/km).
	Pools	Site-total count pools (pools/km).
	Residual pool depth	Raw residual depth of each pool; site-average residual depth of all site pools.
	Fish cover	Percent class by area of stream covered by each of 9 cover types at 11 measurement points; site-averaged percent class for each of 9 cover types.
	Off-channels habitats	List of each off-channel habitat unit by type; length of each off-channel habitat unit; site-total count of each of 6 types of off-channel habitats; site-total length of off-channel habitats.
	Macro-invertebrate composition	Macroinvertebrate sample.
Channel condition	Stream gradient	Straight-line distance between transect/thalweg intersections; straight line length of sample-site; elevation drop between transect/thalweg intersections; total elevation drop over sample site; site averaged stream gradient.
	Width/depth ratio	Site averaged width/depth ratio.
	Wetted width	Site averaged wetted width.
	Bankfull width	Site averaged bankfull width.
	Bank stability	Percent of the lineal distance of bank that is actively eroding at the active channel height at 22 measurement points; site-averaged percent of the lineal distance of bank that is actively eroding at the active channel height.
	Entrenchment Ratio	Entrenchment ratio calculated at each measuring point; site-averaged entrenchment ratio.
	Sinuosity	Site-averaged sinuosity.
Riparian Condition	Structure	Percent class of areal cover (by three vegetation classes) at each of 22 measurement points; site-averaged percent class of areal cover (by three vegetation classes); vegetation type will be described at each of 22 measurement points.
	Disturbance	The presence (11 classes) and proximity (4 classes) of human land-use activities in the riparian area at 22 measurement points.
	Canopy cover	Raw canopy cover data at 66 measurement points; site-averaged canopy cover
Reach Characterization	Channel type (Rosgen)	Predominant Rosgen Level 1 channel type within site based on sinuosity, entrenchment ratio, width: depth ratio, and slope; notes if site encompasses more than one Rosgen channel type.
	Bed-form type	Predominant bed-form type within site; amount of confinement within site.